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GRADE 12 DIPLOMA EXAMINATION

Biology 30

January 1990

Alberta
EDUCATION

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**GRADE 12 DIPLOMA EXAMINATION
BIOLOGY 30**

DESCRIPTION

Time: 2½ hours

Total possible marks: 100

This is a **closed-book** examination consisting of **two** parts:

PART A has 70 multiple-choice questions each with a value of one mark.

PART B has seven written-response questions for a total of 30 marks.

<p>NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work. No marks will be given for work done on the tear-out pages.</p>
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GENERAL INSTRUCTIONS


Fill in the information required on the answer sheet and the examination booklet as directed by the examiner.

Carefully read the instructions for each part before proceeding.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE EXAMINATION BOOKLET.

The presiding examiner will collect your answer sheet and examination booklet and send them to Alberta Education.

JANUARY 1990



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PART A

INSTRUCTIONS

In this part of the examination, there are 70 multiple-choice questions each with a value of one mark.

Read each question carefully and decide which of the choices **best** completes the statement or answers the question. Locate that question number on the separate answer sheet provided and fill in the space that corresponds to your choice. **Use an HB pencil only.**

Example

This diploma examination is for the subject area of

- A. Biology
- B. Physics
- C. Chemistry
- D. Mathematics

Answer Sheet

A	B	C	D
●	②	③	④

If you wish to change an answer, erase your first mark completely.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work. **No marks** will be given for work done on the tear-out pages.

DO NOT TURN THE PAGE TO START THE EXAMINATION UNTIL TOLD TO DO SO BY THE PRESIDING EXAMINER.

PART A

IDENTIFICATION

In this part of the examination, there are 20 multiple-choice questions. Each question has four possible answers, only one of which is correct.

Read each question carefully and decide which of the four possible answers is correct. Mark your answer in the space provided. You must mark only one answer for each question. If you mark more than one answer, your answer will be considered incorrect.

Question	Answer
1. Which of the following is a primary function of the respiratory system?	A. To transport oxygen to the body's cells
2. Which of the following is a primary function of the digestive system?	B. To break down food into smaller particles
3. Which of the following is a primary function of the circulatory system?	C. To transport blood throughout the body
4. Which of the following is a primary function of the excretory system?	D. To remove waste from the body

It now remains to select the correct answer for each question.

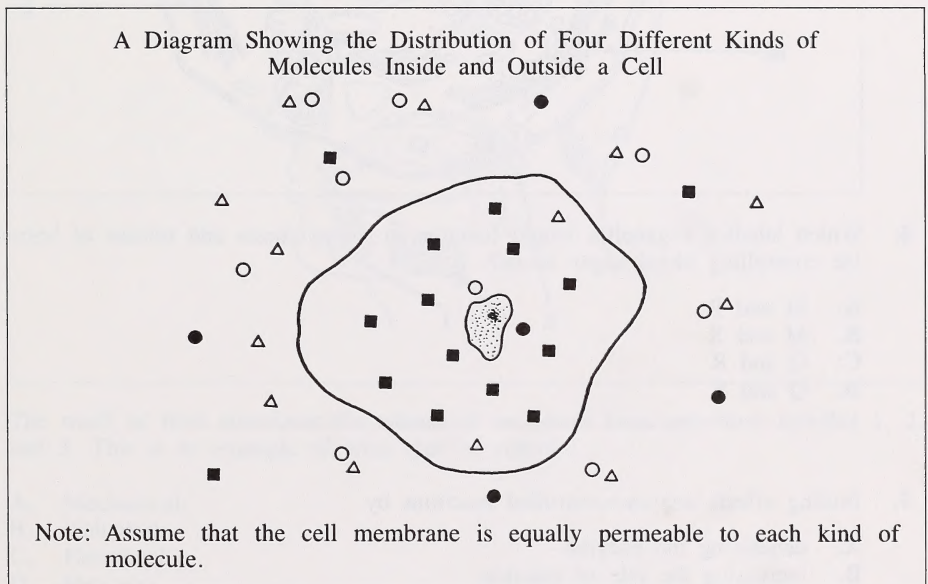
NOTE: The correct answer to each question is indicated by a letter (A, B, C, or D) in the space provided. You must mark only one answer for each question. If you mark more than one answer, your answer will be considered incorrect.

DO NOT FILL THE SPACE TO THE RIGHT OF THE EXAMINATION TITLE.

1. The cell organelles of muscle tissue that contribute to an increase in body temperature are
 - A. lysosomes
 - B. ribosomes
 - C. mitochondria
 - D. Golgi apparatuses

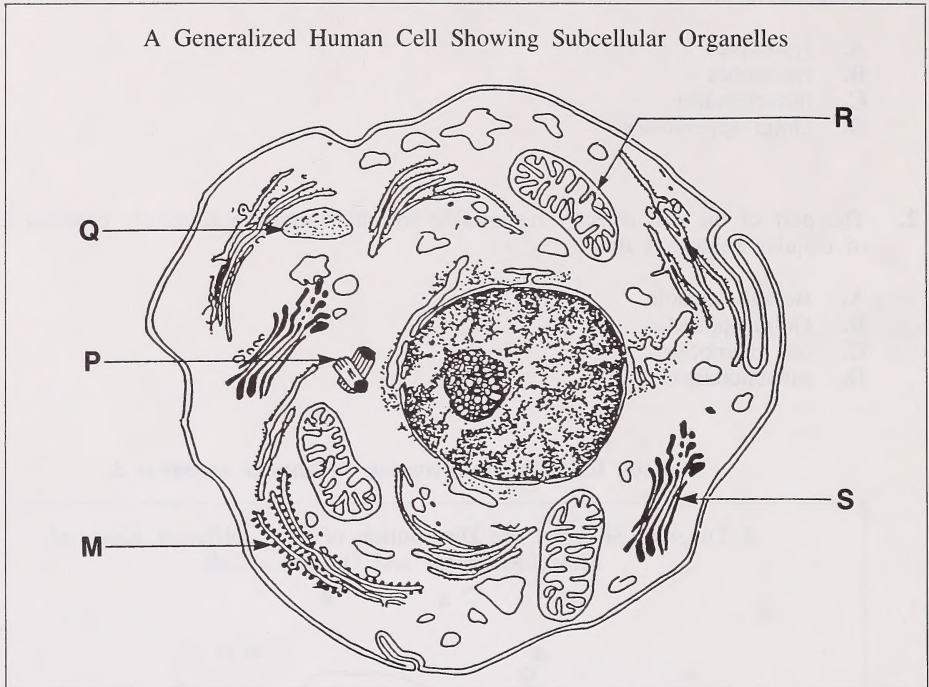
2. The part of the cell directly responsible for maintaining a relatively constant level of cellular solutes is the
 - A. storage vacuole
 - B. Golgi apparatus
 - C. cell membrane
 - D. mitochondrion

Use the following information to answer question 3.



3. Energy derived from ATP would be needed to move which kind of molecule into the cell?
 - A. ○
 - B. ■
 - C. △
 - D. ●

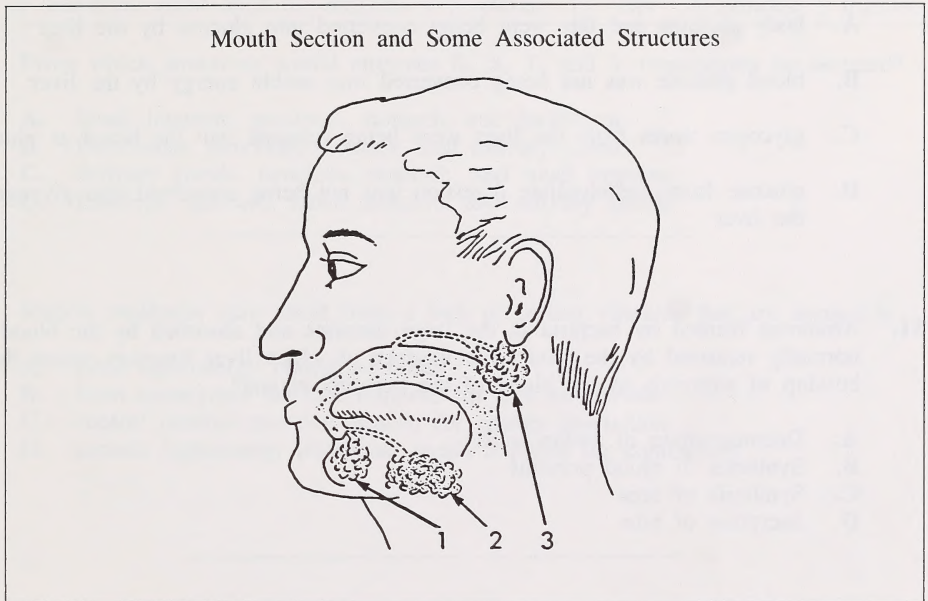
Use the following diagram to answer question 4.



4. Which labelled organelles would function in the synthesis and release of hormones for controlling blood sugar levels?
- A. M and P
 - B. M and S
 - C. Q and R
 - D. Q and S
-
5. Boiling affects enzyme-controlled reactions by
- A. denaturing the enzyme
 - B. increasing the rate of reaction
 - C. increasing the energy of activation
 - D. decreasing the energy of activation
6. The segment of the digestive system that first receives pancreatic enzymes and bile is the
- A. gallbladder
 - B. duodenum
 - C. pancreas
 - D. liver

7. When egg white was tested for the presence of protein, a purple/pink mass formed. The indicator added to the egg white suspension was
- A. iodine
 - B. Sudan IV
 - C. Biuret reagent
 - D. Benedict's reagent

Use the following diagram to answer question 8.



8. The smell of food stimulates the release of secretions from structures labelled 1, 2, and 3. This is an example of what type of control?
- A. Mechanical
 - B. Voluntary
 - C. Hormonal
 - D. Nervous
-
9. In comparison to many other organisms, humans produce a wide variety of digestive enzymes. This variety of enzymes is probably related to the
- A. diversity of foods humans consume
 - B. length of the human digestive tract
 - C. difficulty in digesting proteins and lipids
 - D. inability of digestive enzymes to be utilized over and over again

Use the following information to answer questions 10 and 11.

An individual with hepatitis has lost 95% of liver function. After eating a meal containing carbohydrates, proteins, and lipids, when sufficient time for digestion and absorption to occur had passed, the individual had a blood analysis done. In comparison with normal blood composition, glucose levels were three times higher, ammonia levels were above normal, and plasma protein levels were below normal.

10. The **best** explanation for the high glucose levels in the blood is that
- A. body proteins and fats were being converted into glucose by the liver
 - B. blood glucose was not being converted into usable energy by the liver
 - C. glycogen stores from the liver were being released into the blood as glucose
 - D. glucose from carbohydrate digestion was not being converted into glycogen by the liver
11. Ammonia formed by bacteria in the large intestine and absorbed by the blood is normally removed by the liver. The absence of which liver function causes the buildup of ammonia in the blood of the hepatitis patient?
- A. Decomposition of amino acids
 - B. Synthesis of blood proteins
 - C. Synthesis of urea
 - D. Secretion of bile
-

Use the following information to answer question 12.

Two Characteristics of Four Digestive Enzymes				
Characteristic	Enzyme			
	R	S	T	V
Optimum pH for enzyme function	6-7	7-8	1-2	7-8
Substrate acted upon by enzyme	starch	fats	proteins	maltose

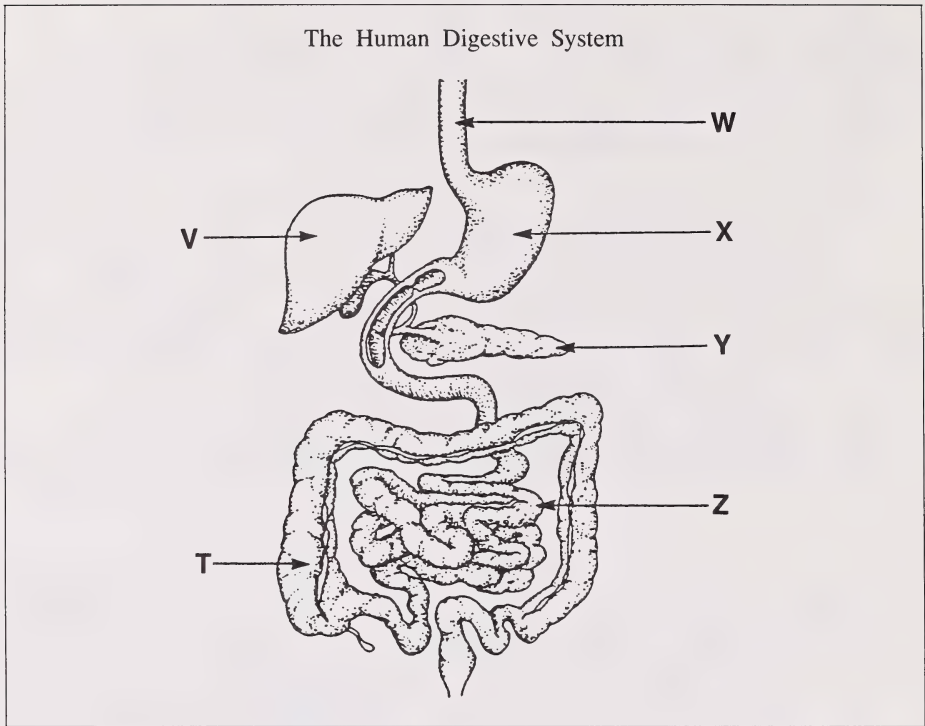
12. From which structures would enzymes R, S, T, and V respectively be secreted?

- A. Small intestine, pancreas, stomach, and duodenum
 - B. Duodenum, pancreas, stomach, and salivary glands
 - C. Salivary glands, pancreas, stomach, and small intestine
 - D. Pancreas, stomach, small intestine, and salivary glands
-

13. Muscle weakness may result from a lack of certain vitamins that are needed to

- A. yield high-energy phosphate bonds
- B. form coenzymes that are required for cell metabolism
- C. control passive transport needed for energy production
- D. contain high-energy phosphate bonds required for contraction

Use the following diagram to answer question 14.






14. Which group of labels identifies three structures that undergo peristalsis?

- A. T, V, and Z
- B. T, W, and Z
- C. V, W, and X
- D. V, X, and Y

Use the following information to answer questions 15 and 16.

To investigate the digestion of an organic compound, test tubes W, X, and Y were set up with contents as shown. The pH of the contents of all three test tubes was neutral or adjusted to be neutral at the beginning of the experiment.

W	X	Y
		
olive oil distilled water litmus	olive oil distilled water litmus bile	olive oil distilled water litmus bile lipase

Note: Litmus is blue in a neutral or basic solution and red in an acidic solution.

15. When test tubes W, X, and Y are compared, the contents of Test Tube X would most closely simulate (represent) the contents found in the small intestine of a person with
- A. gallstones
 - B. a gastric ulcer
 - C. normal lipid digestion
 - D. a blocked pancreatic duct
16. After the test tubes and their contents were incubated at 37°C for one hour, it was observed that the contents of Test Tube Y turned red. What caused the pH to change?
- A. Fatty acids
 - B. Lactic acid
 - C. Amino acids
 - D. Nucleic acids
-

Use the following information to answer question 17.

Enzymatic Digestion of Starch		
Test Tube	Contents (Incubated at 37°C for 20 min)	Indicator Added to Contents of Test Tube to Identify Reactants or Products
1	0.1 g starch + 3 mL distilled H ₂ O	Iodine
2	0.1 g starch + 3 mL distilled H ₂ O	Benedict's
3	0.1 g starch + 3 mL amylase solution	Iodine
4	0.1 g starch + 3 mL amylase solution	Benedict's
5	0.1 g starch + 3 mL boiled amylase solution	Iodine
6	0.1 g starch + 3 mL boiled amylase solution	Benedict's

17. The controls of the experiment are test tubes

- A. 1 and 2
 - B. 1 and 4
 - C. 3 and 4
 - D. 3 and 5
-

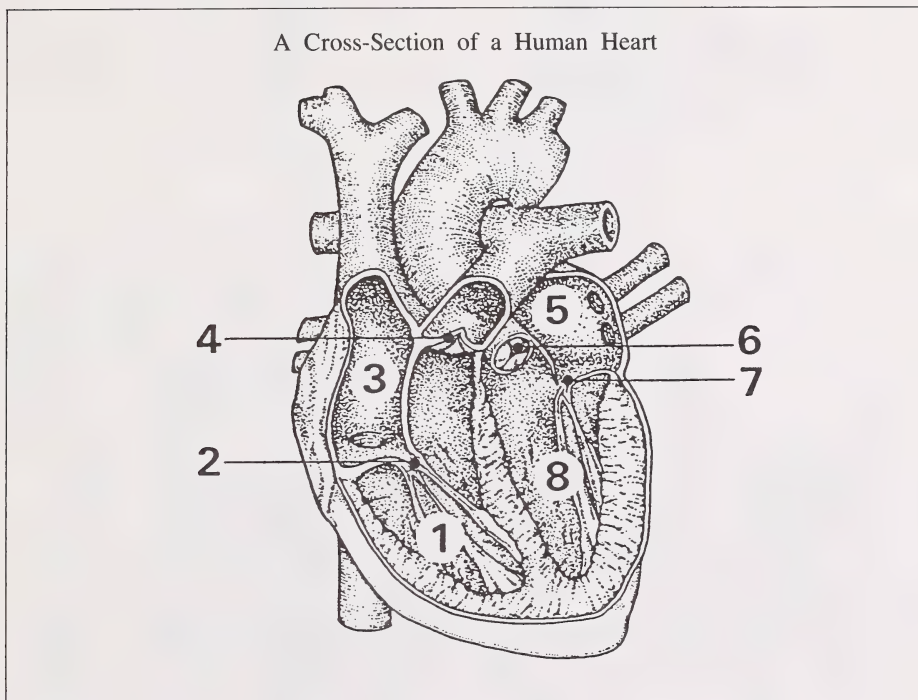
18. Which situation provides the **best** evidence to support the prediction that “secretion of enzymes from the pancreas is under hormonal control”?

- A. The pancreas releases enzymes when food enters the small intestine of a dog.
- B. If the nerves leading to the pancreas of a hungry dog are cut, no enzymes are released from the pancreas.
- C. When the circulatory systems of two dogs are connected and food is placed in the intestine of one dog, the pancreas in each dog secretes enzymes.
- D. When blood from the intestine of a dog is prevented from reaching the pancreas and a nerve leading to the pancreas is stimulated, the pancreas secretes enzymes.

19. The pH of blood is kept relatively constant by

- A. osmotic pressure
- B. hormones
- C. enzymes
- D. buffers

Use the following diagram to answer questions 20 and 21.



20. Which chamber of the heart receives blood from pulmonary circulation?

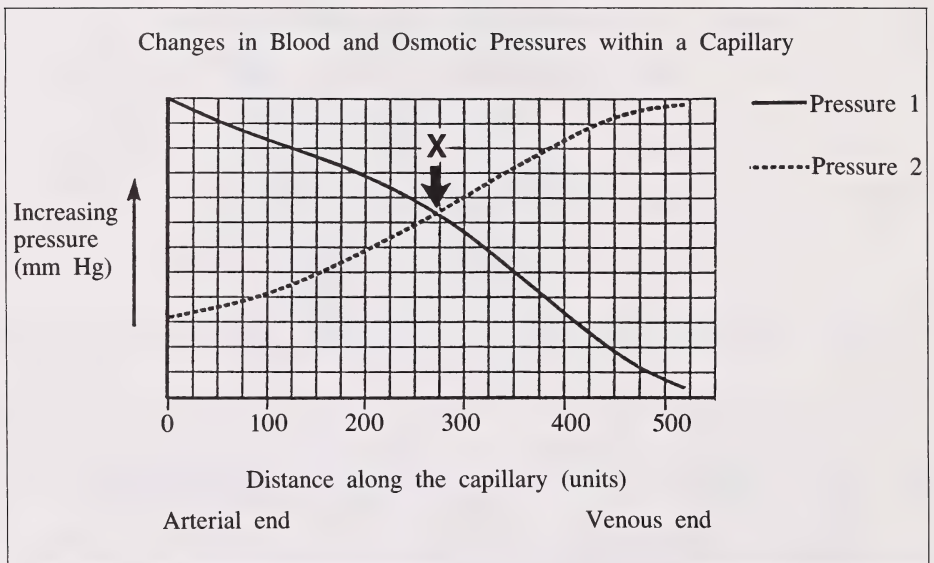
- A. 1
- B. 3
- C. 5
- D. 8

21. The first heart sound ("lub") is produced by the closing of valves labelled

- A. 2 and 4
- B. 2 and 7
- C. 6 and 4
- D. 6 and 7

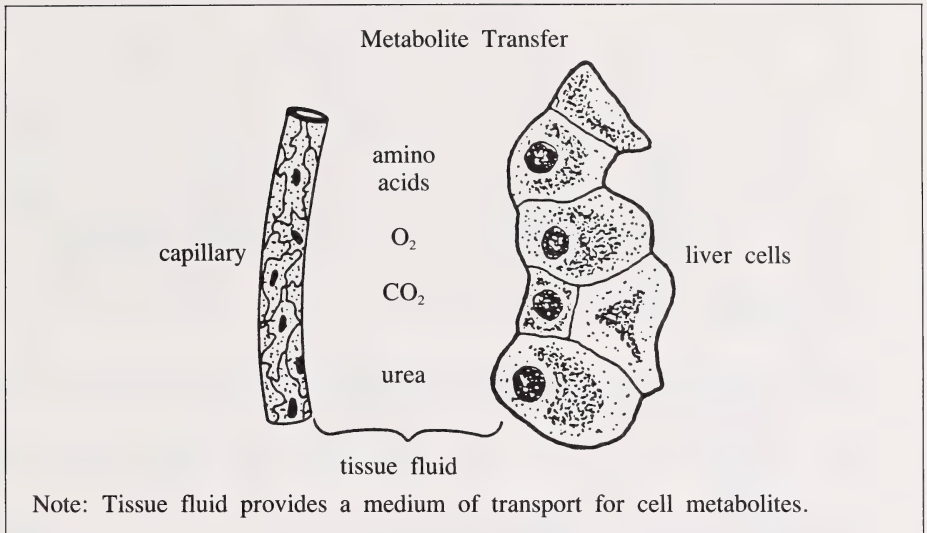
22. Blood pressure would increase if the
- viscosity (thickness) of the blood decreased
 - diameter of the arterioles increased
 - blood volume increased
 - heart rate decreased
23. Two functions of the lymphatic system in an adult are
- gas transport and fat absorption
 - fat absorption and disease control
 - red blood cell production and gas transport
 - red blood cell production and disease control

Use the following graph to answer question 24.



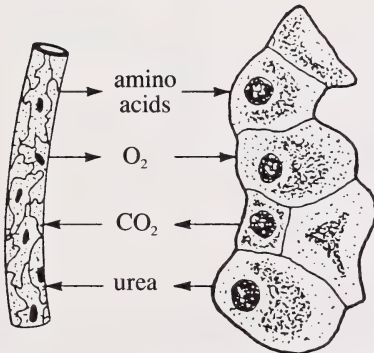
24. The point labelled X on the graph indicates the region
- in which the active transport of blood plasma takes place
 - of the capillary where osmotic pressure equals blood pressure
 - where fluid movement is only from the capillary to the tissues
 - where particle concentration in the capillary equals tissue particle concentration

Use the following diagram to answer question 25.

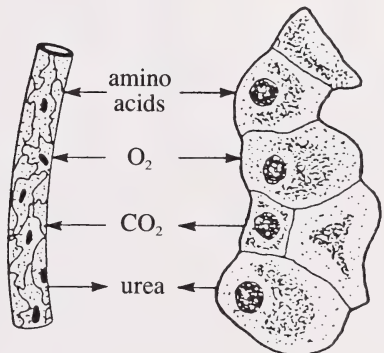


25. Which diagram shows the correct net movement of the metabolites?

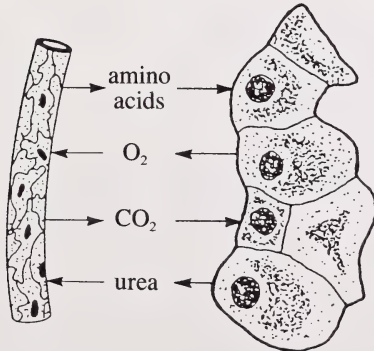
A.



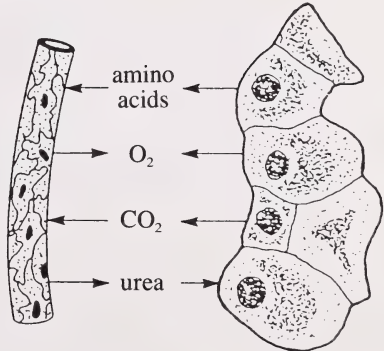
B.



C.



D.



Use the following case study to answer question 26.

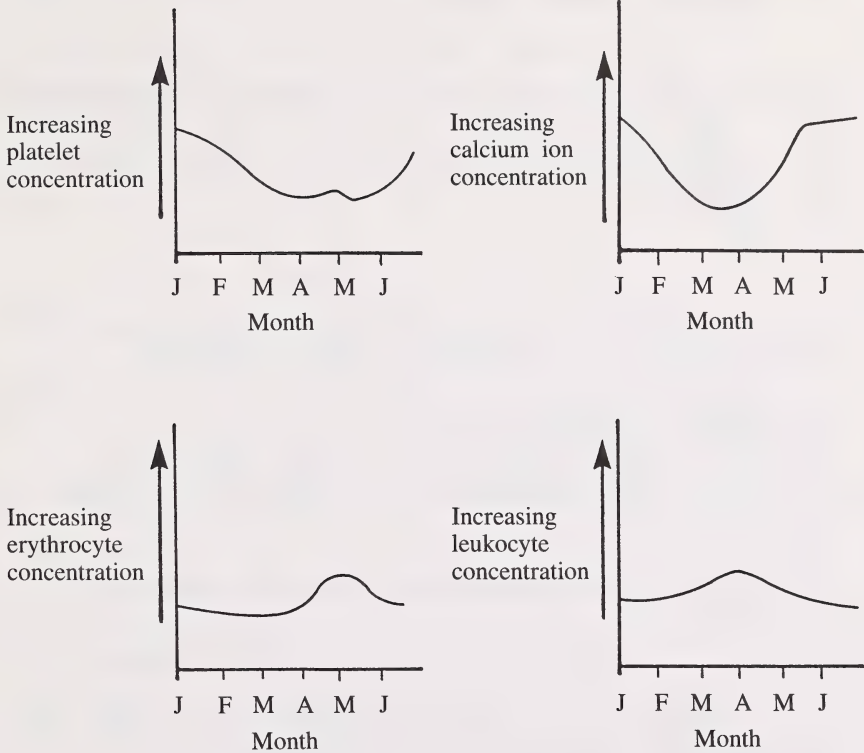
A Case of Hypothermia (Low Body Temperature)

An exposure victim was brought unconscious into the hospital on Sunday, December 24, 1989. The patient's blood pressure was too low to register on the sphygmomanometer. Body temperature was 25°C, and the pulse rate was 20 beats per minute. Medication was administered immediately. The following Wednesday, the patient's blood pressure was 132 mm Hg over 80 mm Hg, the pulse rate was 100 beats per minute, and body temperature was 38°C.

26. The patient did not suffer permanent ill effects from the exposure to cold temperature because
- A. the part of the brain responsible for controlling body temperature no longer functioned at extremely low temperatures
 - B. the metabolic rate of cells, particularly in the brain, greatly increased during exposure
 - C. blood vessels in the skin dilated during exposure, thus preventing heat loss
 - D. oxygen needs of the tissues were greatly reduced at low body temperatures
-

Use the following graphs to answer question 27.

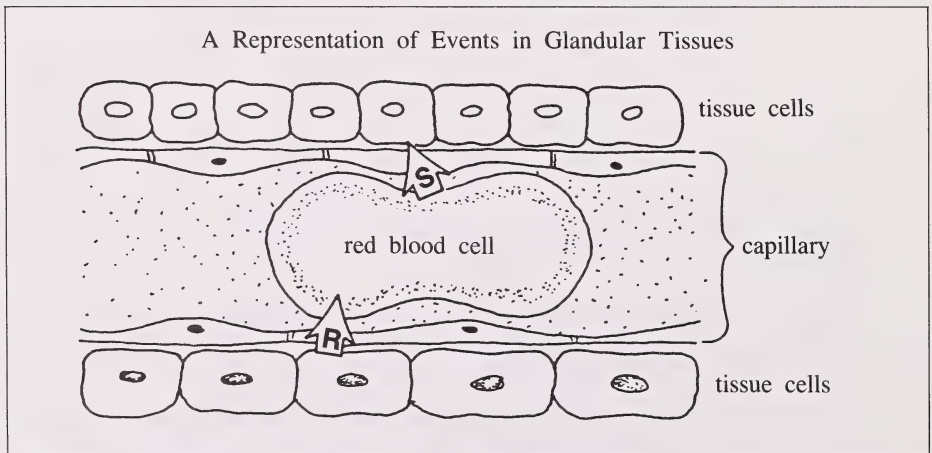
The Blood Condition of an Individual from January to June



27. During which month should this individual have avoided surgery because of a low blood clotting potential?
- A. In June, because the calcium and platelet concentrations were high
 - B. In April, because both calcium and platelet concentrations were low
 - C. In June, because both leukocyte and platelet concentrations were changing
 - D. In April, because the erythrocyte concentration was high and calcium concentration was low

28. The path taken by air during exhalation is
- trachea → larynx → alveolus
 - pharynx → larynx → bronchus
 - alveolus → trachea → bronchus
 - bronchiole → trachea → pharynx
29. The level of CO_2 in the blood regulates the breathing rate by stimulating the
- medulla oblongata
 - hypothalamus
 - diaphragm
 - lungs
30. The breathing control centre sends nerve impulses to the diaphragm and rib muscles. The next step in the breathing sequence is that the
- alveolar air pressure increases and air moves in
 - alveolar air pressure decreases and air moves out
 - rib cage moves up and out and the diaphragm curves upward
 - rib cage moves up and out and the diaphragm flattens downward

Use the following diagram to answer question 31.



31. The diagram represents the diffusion of
- nutrients represented by R and wastes represented by S
 - oxygen represented by R and carbon dioxide represented by S
 - oxygen represented by S and carbon dioxide represented by R
 - oxyhemoglobin represented by R and bicarbonate ions represented by S

Use the following information to answer question 32.

An athlete training at sea level is able to run 1500 m in four minutes. This person moves to a high altitude, continues training for about 60 days, and then returns to sea level.

32. After returning to sea level, the athlete would probably run 1500 m in
- A. less than four minutes because of a decreased erythrocyte count
 - B. less than four minutes because of an increased erythrocyte count
 - C. more than four minutes because of a decreased erythrocyte count
 - D. more than four minutes because of an increased erythrocyte count
-

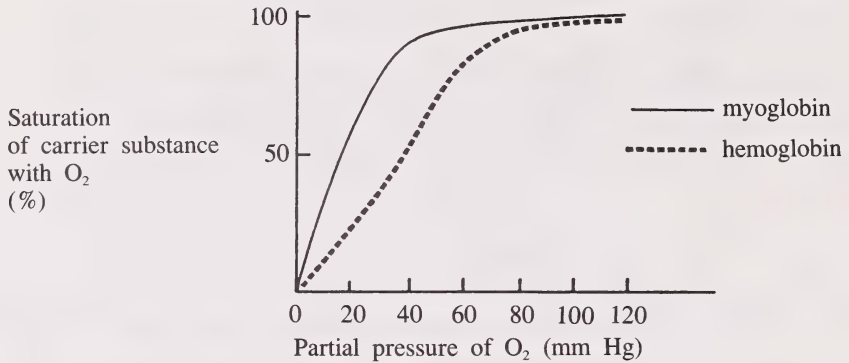
Use the following table to answer question 33.

Composition of Inhaled and Exhaled Air for Subject X		
Component	Percentage by Volume	
	Inhaled Air	Exhaled Air
Nitrogen and inert gases	78.62	74.90
Oxygen	20.85	15.30
Carbon dioxide	0.03	3.60
Water vapor	0.50	6.20
TOTAL	100.00	100.00

33. It would be reasonable to conclude that for Subject X,
- A. the body uses more nitrogen than oxygen
 - B. oxygen is converted to carbon dioxide in lung alveoli
 - C. oxygen and nitrogen are essential for cellular respiration
 - D. carbon dioxide and water vapor are excreted by the lungs
-

Use the following information to answer question 34.

Myoglobin is found in muscle; hemoglobin is carried within red blood cells. The graph shows the ability of each protein to carry O_2 (to be “saturated with oxygen”) in a variety of environments that differ in their O_2 content. Both curves are for proteins isolated from adult humans.



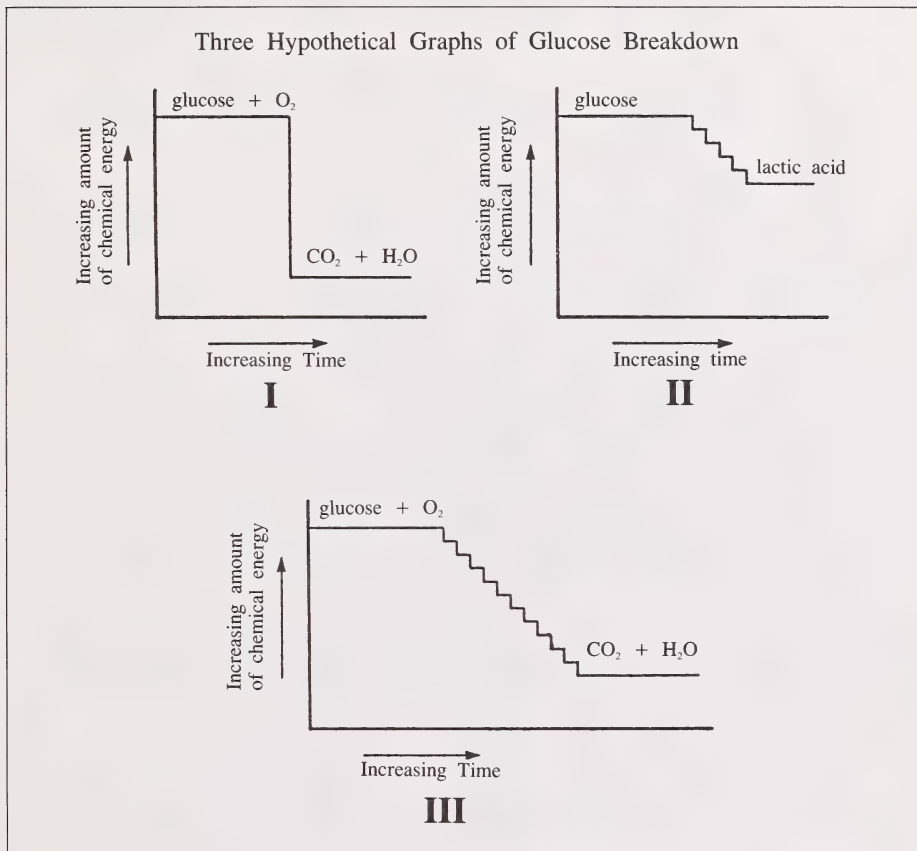
34. A correct interpretation of the graph is that
- A. at 60 mm Hg of partial pressure of O_2 , neither protein carries enough O_2 to be of value to an organism
 - B. hemoglobin can release O_2 when it is in an environment with little O_2 but myoglobin cannot
 - C. myoglobin accepts O_2 in a low-oxygen environment more readily than does hemoglobin
 - D. myoglobin releases O_2 in a high-oxygen environment more readily than does hemoglobin
-

35. Anaerobic respiration

- A. utilizes lactic acid as a fuel
- B. takes place in the absence of O_2
- C. uses H_2O as a temporary hydrogen acceptor
- D. results in the production of large amounts of ATP

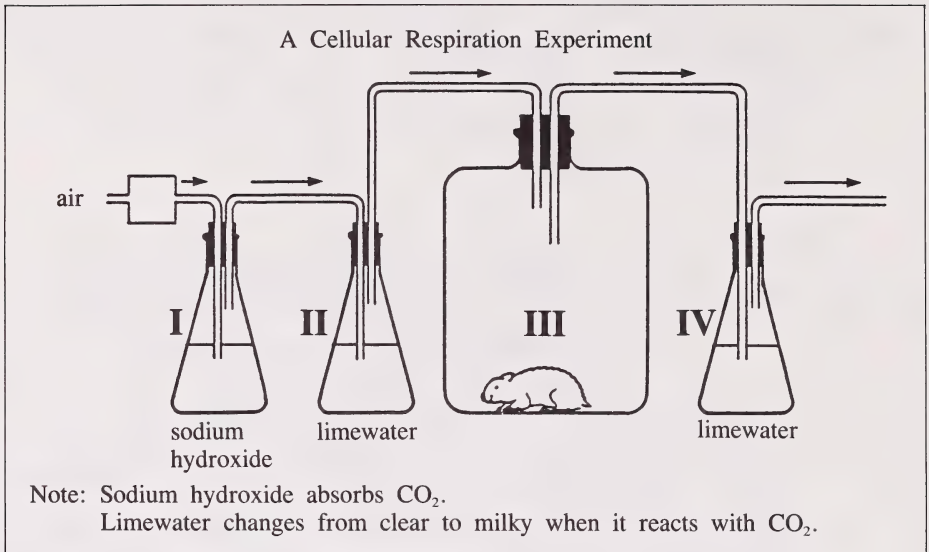
36. An overweight person enters a hospital for an extended period of time to lose weight. The caloric content of the person's diet is drastically reduced. At the same time, this low caloric intake is supplemented by stored energy within the body. The stored energy comes mainly from
- amino acids and vitamins
 - minerals and vitamins
 - carbohydrates
 - fats

Use the following graphs to answer question 37.



37. The graphs that illustrate combustion (burning) and aerobic respiration respectively are
- I and II
 - I and III
 - II and III
 - III and II

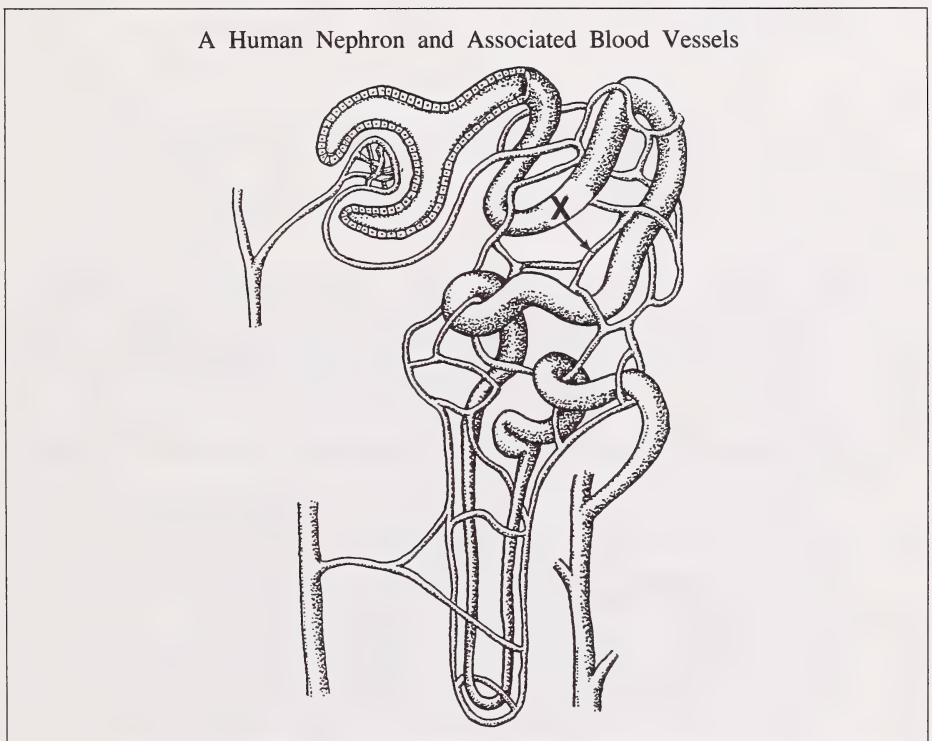
Use the following diagram to answer questions 38 and 39.



38. The use of flasks I and II in the experiment permits the researcher to state with some degree of certainty that
- A. the limewater in Flask IV turns milky because of the production of CO_2 during cellular respiration in the animal
 - B. the gas produced by the animal comes from the breakdown of glucose in cellular respiration
 - C. oxygen is necessary for the animal to carry on cellular respiration
 - D. CO_2 stimulates the process of cellular respiration in the animal
39. The experimental setup is designed to test whether animals, during cellular respiration,
- A. require oxygen
 - B. oxidize glucose
 - C. produce water vapor
 - D. produce carbon dioxide
-
40. What is the correct pathway urine follows from its formation in nephrons to its exit from the body?
- A. Collecting duct → ureter → bladder → urethra
 - B. Collecting duct → urethra → bladder → ureter
 - C. Bladder → collecting duct → ureter → urethra
 - D. Bladder → urethra → collecting duct → ureter

41. The tubules of the nephron help to maintain homeostasis in the body by
- A. forming urea
 - B. removing amino acids
 - C. collecting filtered proteins
 - D. returning material to the blood
42. A blood constituent that normally does **not** enter the nephric filtrate is
- A. urea
 - B. protein
 - C. glucose
 - D. sodium ions

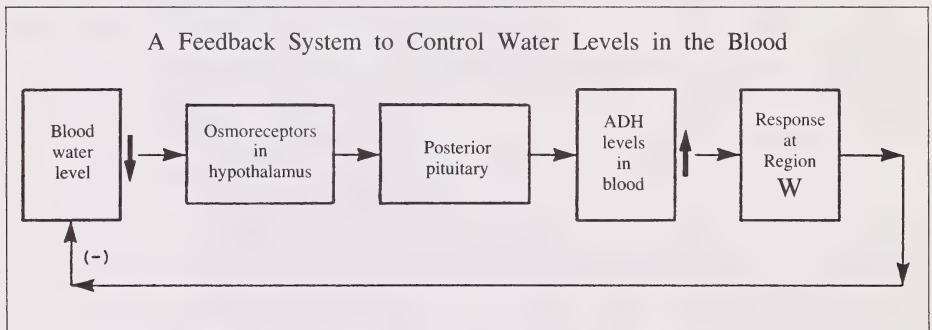
Use the following diagram to answer question 43.



43. The material labelled X, whose pathway is indicated by the arrow, is **best** described as
- A. water being reabsorbed because of an osmotic gradient
 - B. glucose being filtered because of blood pressure
 - C. amino acids being excreted because of diffusion
 - D. sodium ions being reabsorbed by osmosis

44. A hemorrhage (loss of blood) results in a decrease of urine production by
- dilating the blood vessels
 - lowering the blood pressure
 - increasing the amount of filtrate
 - increasing plasma osmotic pressure
45. In response to low blood pressure, the kidney produces Substance M, which in turn causes the adrenal cortex to produce Substance N. The presence of Substance N results in the reabsorption of Substance Q and water into the blood. The reabsorption of water compensates for the low blood pressure. Substance Q is most likely
- ADH
 - adrenaline
 - aldosterone
 - sodium ions

Use the following information to answer question 46.



46. Response at Region W is accomplished by
- increasing the permeability of the proximal tubules
 - decreasing the permeability of the proximal tubules
 - increasing the permeability of the distal tubules and collecting ducts
 - decreasing the permeability of the distal tubules and collecting ducts
47. As the concentration of blood glucose rises after a meal, the concentration of liver glycogen will
- begin to fall
 - begin to rise
 - be affected only slightly
 - change in keeping with urea production

48. One function of adrenaline is to regulate the conversion of

- A. fatty acids and glycerol to fats
- B. amino acids to urea and fat
- C. glucose to glycogen
- D. glycogen to glucose

Use the following table to answer question 49.

Age and Eye Accommodation	
<u>Age in Years</u>	<u>Near Point Accommodation* (cm)</u>
10	7.5
20	10.0
30	11.5
40	17.2
50	65.9
60	90.0
*The shortest distance between the eye and a viewed object where focus of the object can still be achieved.	

49. The loss of near point accommodation with increasing age is most **likely** due to

- A. loss of lens flexibility
- B. uneven curvature of the cornea
- C. loss of light sensitivity of the rods and cones
- D. inability of the iris to adjust to changing light conditions

Use the following information to answer question 50.

Examples of Hormone Regulation

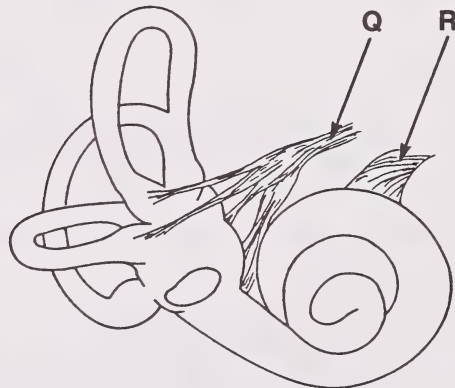
- I. ADH secreted because of hypertonic blood
- II. TSH secreted because of low metabolic rate
- III. Oxytocin secreted because of stretching of the cervix during labor
- IV. Insulin secreted because of absorption of glucose by the intestine
- V. Estrogen and progesterone ingested for the prevention of ovulation

50. Which statements describe homeostatic responses?

- A. I, II, and IV
 - B. I, III, and V
 - C. II and IV
 - D. III and V
-

Use the following diagram to answer question 51.

The Human Inner Ear

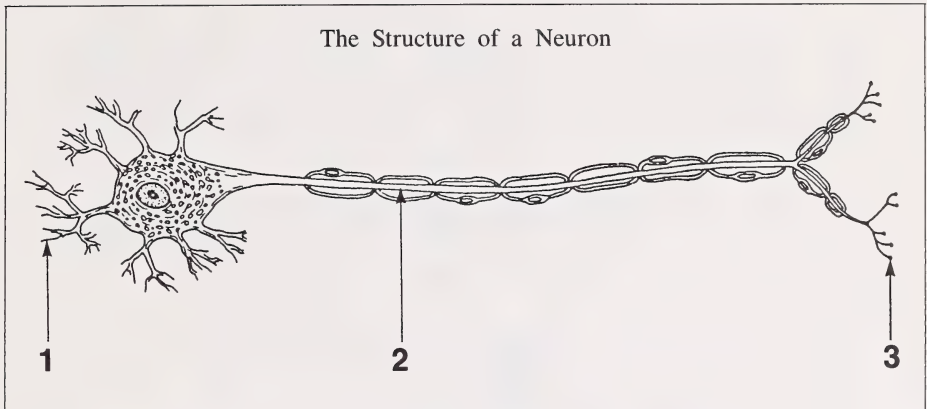


Note: Both Q and R are sensory nerves.

51. Which description of the sensory nerves of the inner ear is correct?

- A. Q carries impulses from chemoreceptors
 - B. R carries impulses from sound receptors
 - C. Q carries impulses from sound receptors
 - D. R carries impulses from motion receptors
-

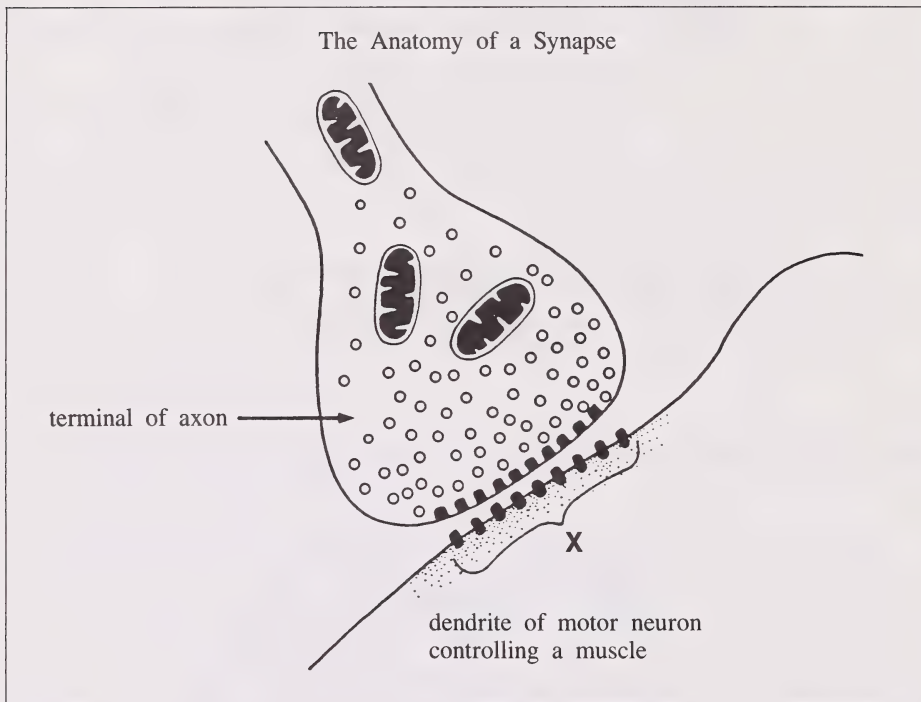
Use the following diagram to answer question 52.



52. If the neuron were stimulated at Location 2, the impulse would travel toward
- A. Location 1, where synaptic transmission occurs
 - B. Location 3, where no synaptic transmission occurs
 - C. locations 1 and 3, causing synaptic transmission at 3 only
 - D. locations 1 and 3, causing synaptic transmission at each end
-
53. Most conscious experiences of the external environment are initiated by impulses from
- A. motor effectors
 - B. sensory receptors
 - C. association neurons
 - D. autonomic sympathetic nerves
54. The all-or-none principle of nerve action refers to the condition in which
- A. a stimulus depolarizes all of the neurons in a nerve or no neurons at all
 - B. a stimulus activates every nerve in the body or none of the nerves at all
 - C. a stimulus activates a nerve cell to function to capacity or not to function at all
 - D. all stimuli reaching nerve cells activate them; therefore no stimulus goes unheeded

55. The nerve pathway of the impulses in a reflex response is
- A. motor neuron → interneuron → sensory neuron → sensory receptor
 - B. sensory neuron → sensory receptor → interneuron → motor neuron
 - C. sensory receptor → sensory neuron → interneuron → motor neuron
 - D. sensory receptor → interneuron → motor neuron → sensory neuron

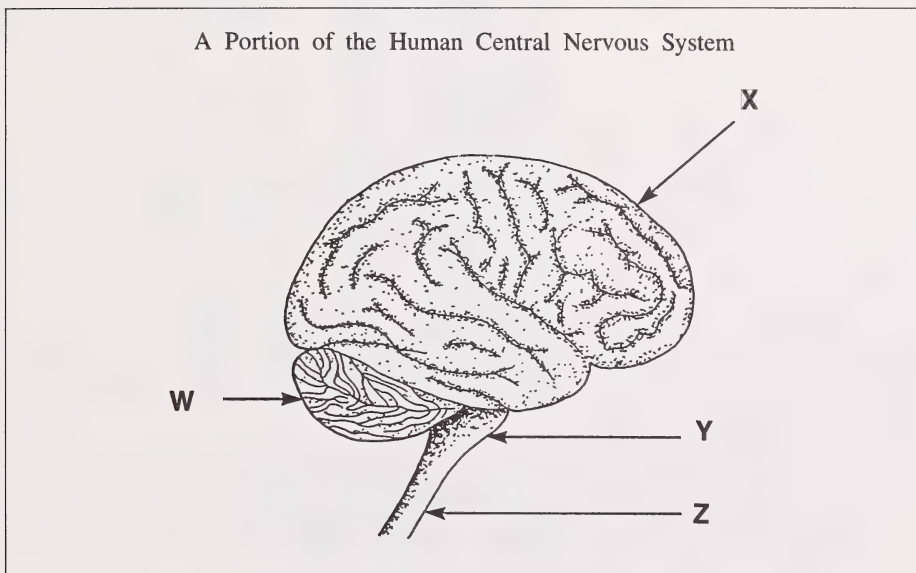
Use the following diagram to answer question 56.



56. A drug that was introduced into the synapse bonded only to structures labelled X of the motor neuron, thus preventing normal function. It could be expected that
- A. muscle paralysis would occur
 - B. the muscle would remain contracted
 - C. the neurotransmitter would not be produced
 - D. sensations originating in the muscle would be lost
-

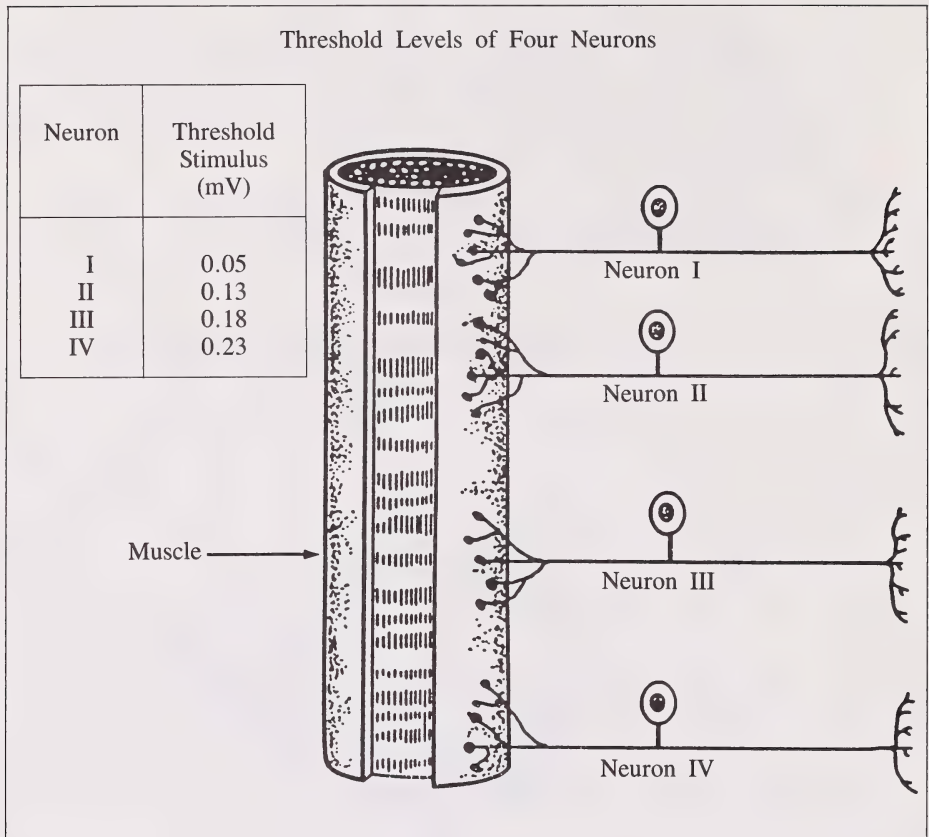
57. An impulse moves from one neuron to an adjacent neuron by
- A. axons of one neuron touching the axon terminals of the adjacent neuron
 - B. dendrites of one neuron touching the axon terminals of the adjacent neuron
 - C. a chemical transmitter released by the dendrites of one neuron stimulating the axon terminals of the adjacent neuron
 - D. a chemical transmitter released by the axon terminals of one neuron stimulating the dendrites of the adjacent neuron

Use the following diagram to answer question 58.



58. Physical co-ordination and higher mental activities such as speech and hearing are controlled by the structures labelled
- A. W and X
 - B. X and Y
 - C. Y and W
 - D. Z and X
-

Use the following information to answer question 59.

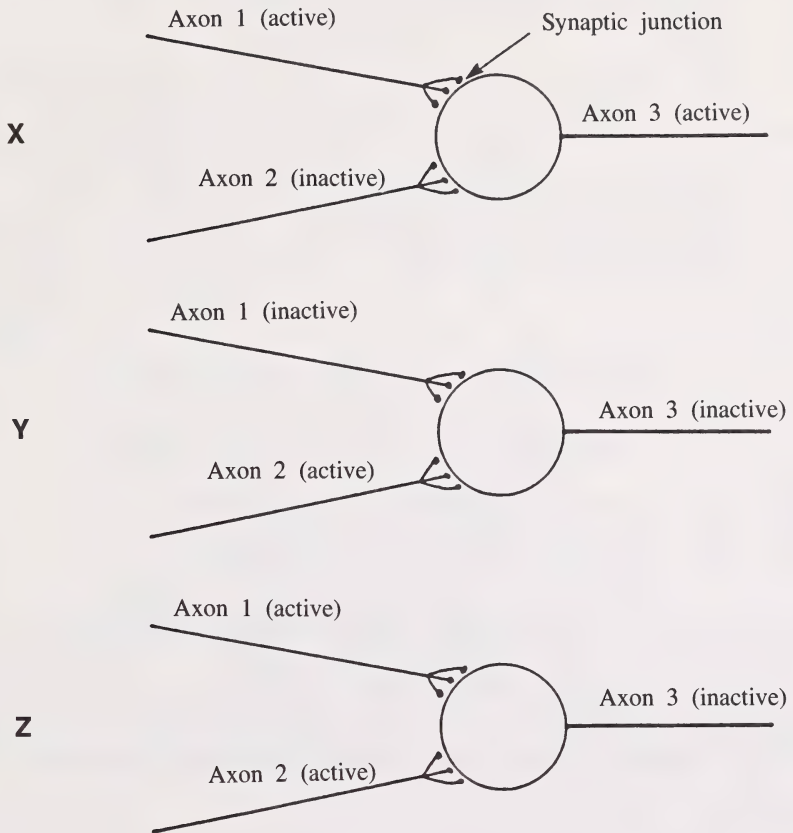


59. An experimenter stimulated each of the neurons with an electric current. The stimulus that would create an impulse in **both** Neuron I and Neuron II but **not** in Neuron III and Neuron IV would be

- A. 0.09 mV
- B. 0.15 mV
- C. 0.18 mV
- D. 0.22 mV

Use the following diagrams to answer question 60.

Three Possible Synaptic Control Patterns (X, Y, and Z)



Note: "Active" means the neuron is transmitting impulses.

"Inactive" means the neuron is not transmitting impulses.

60. If axons 1 and 2 were activated at the same time, the most likely interpretation of Diagram Z would be that
- A. Axon 1 would inhibit the effect of Axon 2
 - B. Axon 2 would inhibit the effect of Axon 1
 - C. Axon 3 would only be affected by Axon 1
 - D. Axon 3 would increase the effect of Axon 2

61. Because muscle contraction requires large amounts of ATP,
- A. ribosomes occur in large numbers in the fibrils of muscles
 - B. cells that produce energy are located close to the muscles
 - C. mitochondria are found in the fibrils of muscles
 - D. nerves must deliver ATP to the muscle
62. The contractile force of a muscle is determined by the
- A. action potential at the neuromuscular junction
 - B. amount of transmitter substance secreted
 - C. threshold potential of the muscle fibre
 - D. number of motor units stimulated

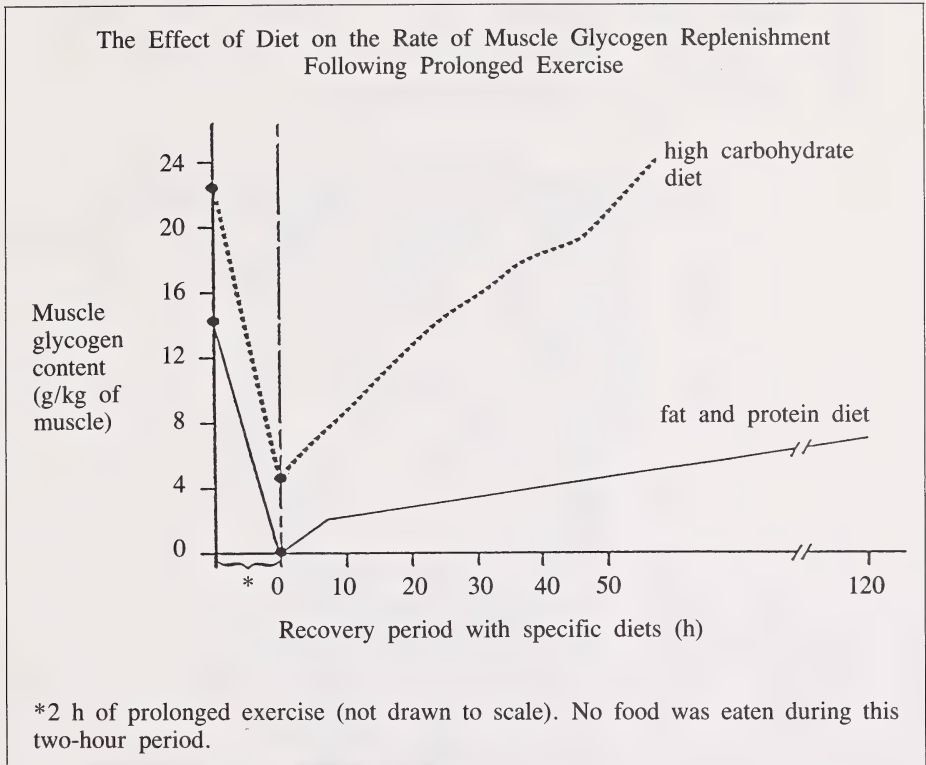
Use the following information to answer question 63.

Some Characteristics of Smooth and Skeletal Muscles

- I. The muscle is in the form of long fibres.
- II. The fibres show striations.
- III. The fibres do not show striations.
- IV. The muscle is under involuntary control.
- V. The muscle is under voluntary control.
- VI. Individual cells are not distinguishable.
- VII. Cells are arranged in sheets.
- VIII. Individual cells are easily seen.

63. The main features of skeletal muscle are best described by statements
- A. I, II, V, and VI
 - B. I, II, VI, and VII
 - C. I, V, VII, and VIII
 - D. III, IV, VII, and VIII
-

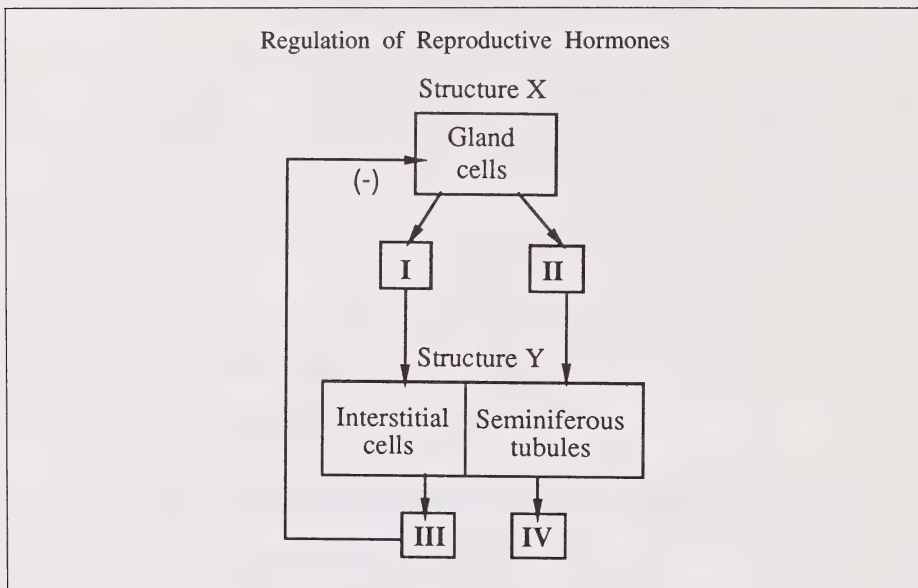
Use the following graph to answer question 64.



64. Athletes who consume foods rich in starches following prolonged exercise replenish their energy reserves in approximately
- A. 5 h
 - B. 15 h
 - C. 50 h
 - D. 120 h
-
65. A structure in the human male that performs an important function in both excretion and reproduction is the
- A. ureter
 - B. urethra
 - C. vas deferens
 - D. prostate gland

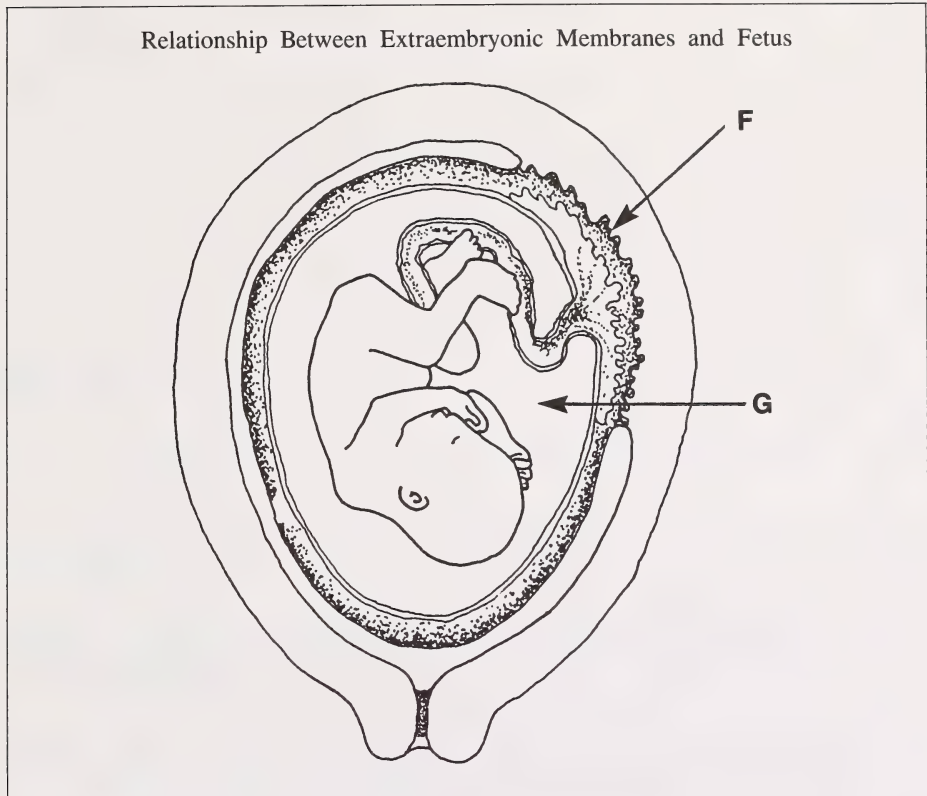
66. In human males, viable sperm cannot be produced if the
- Cowper's glands are inactive
 - prostate gland has been removed
 - vasa deferentia have been severed
 - testes have not descended into the scrotum

Use the following flow chart to answer question 67.



67. The products represented by the numbers I, II, III, and IV respectively are
- ICSH (LH), FSH, sperm, and testosterone
 - FSH, ICSH (LH), testosterone, and sperm
 - ICSH (LH), FSH, testosterone, and sperm
 - FSH, ICSH (LH), sperm, and testosterone
-
68. Damage to a female's pituitary gland just before puberty may result in
- a reduction in estrogen production and inhibition of the development of secondary sexual characteristics
 - a reduction in estrogen production and stimulation of the development of secondary sexual characteristics
 - an increase in progesterone production and inhibition of the development of secondary sexual characteristics
 - an increase in progesterone production and stimulation of the development of secondary sexual characteristics

Use the following diagram to answer questions 69 and 70.



69. Which hormone is responsible for the maintenance of tissue labelled F?

- A. FSH
- B. Oxytocin
- C. Aldosterone
- D. Progesterone

70. Which is **not** a function of the region labelled G?

- A. Protects the fetus from mechanical injury
- B. Provides a primitive lung for gas exchange
- C. Provides a fluid environment for fetal growth
- D. Protects the fetus from sudden temperature changes

YOU HAVE NOW COMPLETED THE MULTIPLE-CHOICE PART OF THE EXAMINATION. PROCEED DIRECTLY TO PART B.

PART B

INSTRUCTIONS

In this part of the examination, there are seven written-response questions for a total of 30 marks.

Read each question carefully. Write your answers in the examination booklet as neatly as possible.

Communicate your answers in clear, concise statements. Marks will be awarded for pertinent explanations and answers. Question 5 has two marks allotted for written communication skills.

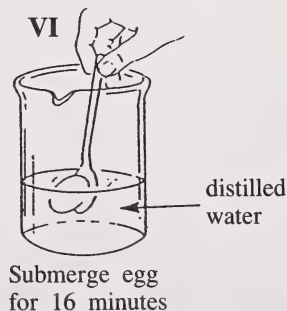
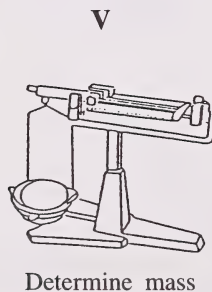
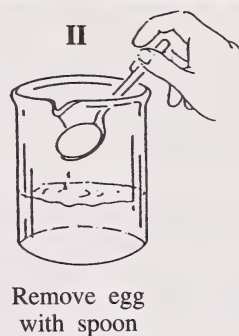
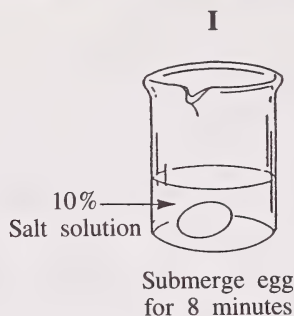
NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work. **No marks** will be given for work done on the tear-out pages.

START PART B IMMEDIATELY.

Use the following information to answer question 1.

An Investigation of Cell Processes

The shell of a fresh chicken egg was removed by dissolving it in certain chemicals. The egg white and yolk, surrounded by soft membranes, were left intact. The mass of the unshelled egg was determined. Then steps I to VI, as outlined below, were followed. After the egg was submerged in distilled water (Step VI) for 16 minutes, steps II to V were repeated. It was observed that the mass of the egg was different for each of the three measurements.



Note: Assume that the egg is a single cell with a salt concentration of 0.9%.

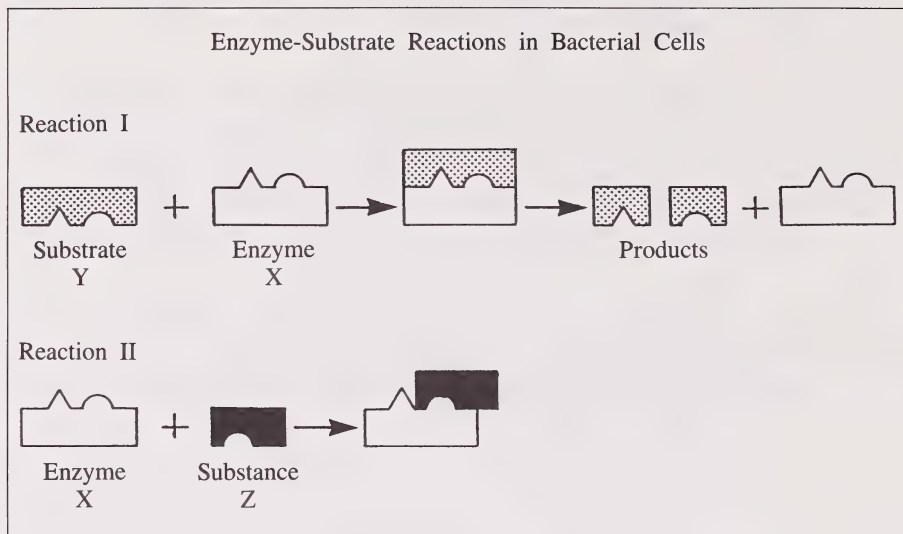
(5 marks)

1. a. In relation to the mass of the unshelled, untreated egg, predict how the mass of the egg would change after the first treatment (Step I). Explain why the change would occur.

- b. In relation to the mass of the unshelled, untreated egg, predict how the mass of the egg would change after the second treatment (Step VI). Explain why the change would occur.

- c. Explain why steps III and IV are necessary in the investigation.

Use the following information to answer question 2.



(3 marks)

2. a. If Substance Z were introduced into Reaction I, how would the reaction be affected?

- b. If Substance Z were an antibiotic, explain how it would be useful in controlling the growth of bacteria.

3. Choose **three** body systems that would be affected by insufficient dietary calcium. Identify an effect of such a shortage on each system.

(3 marks)

System 1 _____

System 2 _____

System 3 _____

4. In an artificial kidney, blood passes through very small channels bounded by thin, porous membranes. The membranous channels along with the blood are suspended in a dialyzing fluid. Describe the main principle on which the transfer of solutes from the blood into the dialyzing fluid is based. Identify two possible conditions that control the amount of substances transferred (removed).

(3 marks)

- I. weak pulse
- II. rapid pulse
- III. lower body temperature
- IV. slightly blue or dark purple coloration of the fingertips

(Four marks will be allotted for concepts and two marks for evidence of logical thought expressed with appropriate vocabulary.)

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(6 marks)

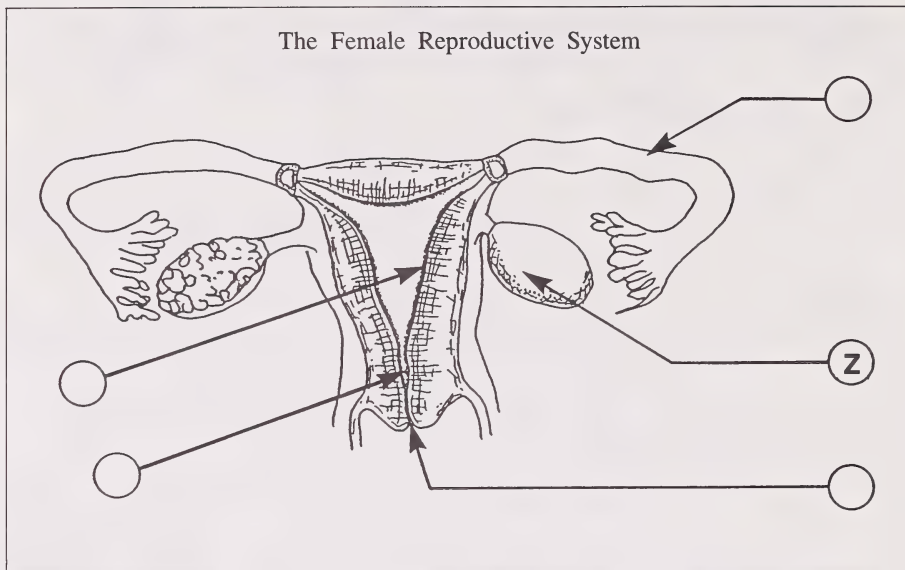
6. A hiker is frightened by the sight of a bear. In response, the autonomic nervous system prepares the hiker's body for appropriate reactions. Select **one** organ from each of the systems listed and describe the changes the organ undergoes. Explain how each of the changes helps the hiker to meet the emergency.

a. The Circulatory System

b. The Endocrine System

c. The Digestive System

Label this diagram as directed in question 7.



(4 marks)

7. a. On the above diagram, indicate:

- the usual site of fertilization by placing an X in the circle of the arrow pointing to the correct structure
- the usual area of implantation by placing a Y in the circle of the arrow pointing to the correct structure

b. Explain how FSH and LH would affect the organ labelled Z.

(i) FSH _____

(ii) LH _____

**YOU HAVE NOW COMPLETED THE EXAMINATION. IF YOU HAVE TIME,
YOU MAY WISH TO GO BACK AND CHECK YOUR ANSWERS.**

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

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FOLD AND TEAR ALONG PERFORATION

FOR DEPARTMENT USE ONLY

M1

M2

M3

M4

FOR DEPARTMENT USE ONLY

BIOLOGY 30

(LAST NAME)

NAME:

(FIRST NAME)

DATE OF BIRTH:

SEX:

PERMANENT MAILING ADDRESS:

(Apt./Street/Ave./P.O. Box)

(Village/Town/City)

(Postal Code)

SCHOOL CODE:

SCHOOL:

SIGNATURE:

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BIOLOGY 30